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09/675,286	09/29/2000	Ganapati Srinivasa	42390P9663	1265

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EXAMINER
ALI, SYED J

ART UNIT	PAPER NUMBER
2127	

DATE MAILED: 02/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.		**Applicant(s)**
Office Action Summary	09/675,286		SRINIVASA ET AL.
	Examiner		**Art Unit**
	Syed J Ali		2127

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2000*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application)
since a specific reference was included in the first sentence of the specification or in an Application Data Sheet.
37 CFR 1.78.

    a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific
reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.

4) ☐ Interview Summary (PTO-413) Paper No(s). _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   Claim 6 is objected to because of the following informalities: "The method of claim 1

further wherein" should read "The method of claim 1 wherein". Appropriate correction is

required.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

3.   Claims 1-2, 5-7, 9-13, 15-18, and 20 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Lyon (USPN 5,739,820) in view of Krum (USPN 6,539,445) in view of Shaw

et al. (USPN 6,362,836) (hereinafter Shaw).

As per claim 1, Lyon discloses a method comprising:

creating a scaled-down representation of input to a compute-intensive application (col. 1

lines 41-50, "The new method uses only a modest number of multiplies and adds to approximate

a prior art calculation taught by Phong that required divides, square roots and powers. The

invention uses approximate normalization, vector differences, and polynomial shape functions to

simplify the processing and improve performance significantly while still generating a graphic

rendering that is very realistic").

Krum discloses the following limitations not shown by Lyon, specifically calculating a

computing requirement based on the scaled-down representation (col. 7 line 18 - col. 8 line 24,

"the routine invokes a calculate computing resource load routine to calculate the computing

resource load on the farm system at the start time. In block 412, the routine adds the load to the

calculated computing resource load to give the estimated computing resource load for the farm

system while the job is running"); and

calculating a turn-around time to run the compute-intensive application with the input, on

one or more processors, based on the calculated computing requirement (col. 7 line 18 - col. 8

line 24, "the routine calculates the estimated completion time by adding the start time to the

execution time").

It would have been obvious to one of ordinary skill in the art to combine Lyon with Krum

since Lyon discloses an efficient system for reducing in complexity a computationally intensive

operation, yet fails to indicate how the scaled down representation would translate into an actual

reduction in execution time. This drawback is of great import since current graphics processing

can require very high computational demands, such that knowing the benefit gained from a

reduction in that load could permit a client to determine whether it is more efficient to do the

processing itself, or to submit the work to a farm. Krum accounts for this deficiency by taking

input from a client and determining the additional processing load that the input would require,

as well as the execution time required to complete the processing. By taking into account both

the system's current processing load such that the start time of the processing can be determined,

as well as the estimated execution time, Krum can reasonably estimate the completion time for the processing.

Shaw discloses the following limitations not shown by the modified Lyon, specifically calculating an actual cost to a customer to run an application (col. 17 line 31 - col. 18 line 37, "Table 2 of Fig. 5 provides relative costs - basic and per pixel - of the various graphics operations. Table 2 does not provide costs for all of the AIP request display operations. In actual operation, costs for all AIP requests supported by DE 278 are provided in a table in PE 276. It contains a per pixel relative cost and a basic relative cost for each operation") and sending the turn-around time and cost to a customer's client software (col. 7 lines 26-36, "Client connections and requests, 30, are routed to the appropriate interfaces on UAP server 50 which in turn processes them using one or more of the UAP engines described below and obtains the requested service or data from the appropriate application server 82. UAP server 50 then returns to the client devices 14 display requests from the requested application and other data").

It would have been obvious to one of ordinary skill in the art to combine the modified Lyon with Shaw since the modified Lyon provides a method of estimating a computation time associated with a simplified representation of an application at a CPU farm, yet fails to calculate a cost associated with processing the application or relaying information pertaining to the execution time and costs to a user issuing the requests. Shaw makes up for this deficiency by calculating the cost required with a graphics operation, as well as establishing a line of communication between a client and a server so that information relating to an issued request is available. This would allow a client to determine if submitting a job is cost-effective and time-effective.

As per claim 2, Lyon discloses the method of claim 1 wherein the compute-intensive application is to perform computer graphics rendering (col. 1 lines 41-50, "it is a primary objective of the present invention to provide a system for computing a specular reflection shading calculation for 3D renderings of realistic graphic images").

As per claim 5, "Official Notice" is taken that it would have been obvious to one of ordinary skill in the art that the scaled-down representation of the application input includes the geometry, lights, number of triangles, textures, shading method, camera, ray-tracing, anti-aliasing, and motion-blur of an underlying scene. Specifically, Lyon refers to a method of reducing the complexity associated with specular reflection, i.e., shading method. Although this corresponds to only one of the claimed aspects of a scene to be rendered, the remainder of the aspects of scene rendering are well known and expected in the art. That is, for graphics rendering, the claimed components are essential to the realistic portrayal of a scene, and the method of Lyon of approximating calculations without using square roots and powers is applicable to other types of rendering than shading. By reducing the calculation of normal vectors and other such calculations requiring square roots and powers, the overall computation requirement can be reduced. It would have been obvious to one of ordinary skill in the art to apply the computational technique to other aspects of scene rendering such that the total computing requirement can be reduced, and not only that associated with the shading method.

As per claim 6, Shaw discloses the method of claim 1 wherein the turn-around time and actual cost are transmitted over an internet to the customer's client software (col. 6 lines 48-62, "the network 10 comprises three tiers used to illustrate the connections of the various inventive processes and routing of data information among the various processes and components comprising the network").

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw for reasons discussed above in reference to claim 1.

As per claim 7, Shaw discloses the method of claim 1 wherein the cost is in terms of input units (col. 17 line 31 - col. 18 line 38, "The cost numbers are used by the cost calculation in the following way. The cost per pixel value is multiplied by an estimate of the number of pixels touched by the operation. The basic cost per display operation is multiplied by the number of basic operations that make up the request", wherein the cost is based on the number of pixels required to draw the input display image).

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw for reasons discussed above in reference to claim 1.

As per claim 9, Shaw discloses the method of claim 7 wherein the input units are image frames (col. 17 line 31 - col. 18 line 38, "The cost numbers are used by the cost calculation in the following way. The cost per pixel value is multiplied by an estimate of the number of pixels touched by the operation. The basic cost per display operation is multiplied by the number of

basic operations that make up the request", wherein the cost is based on the number of pixels required to draw the input display image).

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw for reasons discussed above in reference to claim 1.

As per claim 10, Lyon discloses a system comprising:

an application-specific module to model input data (col. 1 lines 41-50, "The new method uses only a modest number of multiplies and adds to approximate a prior art calculation taught by Phong that required divides, square roots and powers. The invention uses approximate normalization, vector differences, and polynomial shape functions to simplify the processing and improve performance significantly while still generating a graphic rendering that is very realistic", wherein the module models input associated with shading a graphic image).

Krum discloses the following limitations not shown by Lyon, specifically a heuristic modeler module coupled to the output of the application-specific module, to calculate a computing requirement (col. 7 line 18 - col. 8 line 24, "the routine invokes a calculate computing resource load routine to calculate the computing resource load on the farm system at the start time. In block 412, the routine adds the load to the calculated computing resource load to give the estimated computing resource load for the farm system while the job is running"); and

a run-time calculator module coupled to the output of the heuristic modeler module, to compute a turn-around time to run the application on one or more processors (col. 7 line 18 - col. 8 line 24, "the routine calculates the estimated completion time by adding the start time to the execution time").

Shaw discloses the following limitations not shown by either Lyon or Krum, specifically calculating an actual cost to run the application on one or more processors (col. 17 line 31 - col. 18 line 37, "Table 2 of Fig. 5 provides relative costs - basic and per pixel - of the various graphics operations. Table 2 does not provide costs for all of the AIP request display operations. In actual operation, costs for all AIP requests supported by DE 278 are provided in a table in PE 276. It contains a per pixel relative cost and a basic relative cost for each operation").

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw for reasons discussed above in reference to claim 1.

As per claim 11, Shaw discloses the system of claim 10 wherein the modules are to communicate with each other over an internet (col. 6 lines 48-62, "the network 10 comprises three tiers used to illustrate the connections of the various inventive processes and routing of data information among the various processes and components comprising the network").

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum, and Shaw for reasons discussed above in reference to claim 1.

As per claim 12, "Official Notice" is taken that it would have been obvious to one of ordinary skill in the art that the scaled-down representation of the application input includes the geometry, lights, number of triangles, textures, shading method, camera, ray-tracing, anti-aliasing, and motion-blur of an underlying scene for reasons discussed above in reference to claim 5.

As per claim 13, Lyon discloses an article of manufacture comprising:

a machine readable medium containing instructions which, when executed by a processor, cause a machine to perform operations comprising:

creating a scaled-down representation of input at a customer's machine (col. 1 lines 41-50, "The new method uses only a modest number of multiplies and adds to approximate a prior art calculation taught by Phong that required divides, square roots and powers. The invention uses approximate normalization, vector differences, and polynomial shape functions to simplify the processing and improve performance significantly while still generating a graphic rendering that is very realistic").

Krum discloses the following limitations not shown by Lyon, specifically calculating a computing requirement based on input having been created at a customer's machine (col. 7 line 18 - col. 8 line 24, "the routine invokes a calculate computing resource load routine to calculate the computing resource load on the farm system at the start time. In block 412, the routine adds the load to the calculated computing resource load to give the estimated computing resource load for the farm system while the job is running"); and

calculating a turn-around time to run the compute-intensive application with the input, on one or more processors, based on the calculated computing requirement (col. 7 line 18 - col. 8 line 24, "the routine calculates the estimated completion time by adding the start time to the execution time").

Shaw discloses the following limitations not shown by either Lyon or Krum, specifically calculating an actual cost to the customer (col. 17 line 31 - col. 18 line 37, "Table 2 of Fig. 5 provides relative costs - basic and per pixel - of the various graphics operations. Table 2 does

not provide costs for all of the AIP request display operations. In actual operation, costs for all

AIP requests supported by DE 278 are provided in a table in PE 276. It contains a per pixel

relative cost and a basic relative cost for each operation"); and

providing the turn-around time and the actual cost to the customer's client software (col.

7 lines 26-36, "Client connections and requests, 30, are routed to the appropriate interfaces on

UAP server 50 which in turn processes them using one or more of the UAP engines described

below and obtains the requested service or data from the appropriate application server 82. UAP

server 50 then returns to the client devices 14 display requests from the requested application and

other data").

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum,

and Shaw for reasons discussed above in reference to claim 1.

As per claim 15, "Official Notice" is taken that it would have been obvious to one of

ordinary skill in the art that the scaled-down representation of the application input includes the

geometry, lights, number of triangles, textures, shading method, camera, ray-tracing, anti-

aliasing, and motion-blur of an underlying scene for reasons discussed above in reference to

claim 5.

As per claim 16, Shaw discloses the article of manufacture of claim 13 wherein the

medium includes further instructions to enable the scaled-down representation of the input to be

received over an internet from the client software (col. 6 lines 48-62, "the network 10 comprises

three tiers used to illustrate the connections of the various inventive processes and routing of data

information among the various processes and components comprising the network").

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum,

and Shaw for reasons discussed above in reference to claim 1.

As per claim 17, Shaw discloses the article of manufacture of claim 13 wherein the

medium includes further instructions to enable the turn-around time and actual cost to be

transmitted over the internet to the customer's client software (col. 6 lines 48-62, "the network

10 comprises three tiers used to illustrate the connections of the various inventive processes and

routing of data information among the various processes and components comprising the

network").

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum,

and Shaw for reasons discussed above in reference to claim 1.

As per claim 18, Shaw discloses the article of manufacture of claim 13 wherein the

medium includes further instructions to calculate the cost in terms of input units (col. 17 line 31 -

col. 18 line 38, "The cost numbers are used by the cost calculation in the following way. The

cost per pixel value is multiplied by an estimate of the number of pixels touched by the

operation. The basic cost per display operation is multiplied by the number of basic operations

that make up the request", wherein the cost is based on the number of pixels required to draw the

input display image).

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum,

and Shaw for reasons discussed above in reference to claim 1.

As per claim 20, Shaw discloses the article of manufacture of claim 18 wherein the

medium includes further instructions to calculate the cost in terms of input units being image

frames (col. 17 line 31 - col. 18 line 38, "The cost numbers are used by the cost calculation in the

following way. The cost per pixel value is multiplied by an estimate of the number of pixels

touched by the operation. The basic cost per display operation is multiplied by the number of

basic operations that make up the request", wherein the cost is based on the number of pixels

required to draw the input display image).

It would have been obvious to one of ordinary skill in the art to combine Lyon, Krum,

and Shaw for reasons discussed above in reference to claim 1.

4.   Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon in view of

Krum in view of Shaw in view of Burgun et al. (USPN 6,336,087) (hereinafter Burgun).

As per claim 3, Burgun discloses the following limitations not shown by the modified

Lyon, specifically the method of claim 1 wherein the compute-intensive application to be

reduced in complexity is to perform logic simulation (col. 4 lines 30-34, "Another example of a

component is a macro block denoting a complex logic function such as memories, counters,

shifters, adders, multipliers, etc. Each of these can be further reduced to primitive gates forming

combinatorial or sequential logic", wherein the complex circuit is reduced in complexity into simple logic gates).

It would have been obvious to one of ordinary skill in the art to combine the modified Lyon with Burgun since logic simulations can often have a high degree of complexity, especially for certain types of circuits such as shift registers and flip flops. Therefore, to reduce these circuits into as simple components as possible, the cost and overhead incurred with the circuits can be substantially reduced. This not only serves to reduce the computation time associated with the circuit, but also reduces the cost incurred with the circuit.

5.   Claims 4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon in view of Krum in view of Shaw in view of Thyagarajan et al. (USPN 6,600,836) (hereinafter Thyagarajan).

As per claim 4, Thyagarajan discloses the following limitations not shown by the modified Lyon, specifically the method of claim 1 wherein the scaled-down representation of the application input is generic to a class of applications (col. 5 lines 39-58, "In many applications, reduced complexity is needed for actual implementation", wherein the scaled down representation is applicable to compressing many types of images for faster processing).

It would have been obvious to one of ordinary skill in the art to combine the modified Lyon with Thyagarajan since the goal of reducing the complexity of an application is meant to achieve the result of a lower cost of processing as well as a faster computation and turn-around time. Since the method of the modified Lyon pertains most specifically to a shading method,

although it may have additional applications, the addition of Thyagarajan permits an image to be reduced in complexity overall. That is, the image being processed is applied against a compression technique that will improve the overall performance, and is not limited to a shading method, or other processing based on vectors and normalization, normally computationally intensive operations.

As per claim 14, Thyagarajan discloses the article of manufacture of claim 13 wherein the medium includes further instructions to create the scaled-down representation of the application input as being generic to a class of applications (col. 5 lines 39-58, "In many applications, reduced complexity is needed for actual implementation", wherein the scaled down representation is applicable to compressing many types of images for faster processing).

It would have been obvious to one of ordinary skill in the art to combine the modified Lyon with Thyagarajan for reasons discussed above in reference to claim 4.

6.   Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon in view of Krum in view of Shaw in view of Agarwal (USPN 5,854,752).

As per claim 8, Agarwal discloses the method of claim 7 wherein the input units that determine the cost are logic gates (Claim 13, "A method as in claim 12, wherein said cost function is expressed in terms of multiples of logic gates").

It would have been obvious to one of ordinary skill in the art to combine the modified Lyon with Agarwal since determining the cost of an application is most easily done by

determining the breadth of an application. In the case of a logic simulation, the complexity is most closely related to the number of logic gates, i.e., the greater the number of logic gates associated with a function, the greater the complexity and thus, the higher the associated cost should be. Therefore, the addition of Agarwal to the modified Lyon provides a satisfactory model of associating higher costs with higher complexity applications.

As per claim 19, Agarwal discloses the article of manufacture of claim 18 wherein the medium includes further instructions to calculate the cost in terms of input units being logic gates (Claim 13, "A method as in claim 12, wherein said cost function is expressed in terms of multiples of logic gates").

It would have been obvious to one of ordinary skill in the art to combine the modified Lyon with Agarwal for reasons discussed above in reference to claim 8.

Conclusion

7.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (703) 305-8106. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (703) 305-9678. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Syed Ali
January 12, 2004

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